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AN EXPLORATORY STUDY ON THE AWARENESS OF TEACHER TRAINEES ON DIGITAL PEDAGOGY

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ABSTRACT

"Investing in education and providing 21st-century skills for students are fundamental components to the nation's continued growth and prosperity"
-Craig Barrett

The globalization and technological innovations have opened wide range of opportunities for the personal growth and development of the people all across the world. However, in terms of expectations and responsibilities, such growth lays a huge responsibility on the academic community. Barrett's aforementioned comment emphasizes the obligation of the educational system to produce more informed and productive citizens for the better present and future. On the other hand, the children of today can be prepared for tomorrow only if the teachers are well educated to do so. The learner of today is a 21st century learner who needs to be updated with knowledge, life skills, technology skills, career skills, traits that are critically important to gain success in today's world. And, to cater such needs, a 21st century teacher is required. Therefore, it is necessary to investigate and debate on the 'means' to improve and reorganize the Teacher Education Programme to create a "21st-century teacher" and a "techno-pedagogue".

This paper emphasizes the importance of incorporating Digital Pedagogy into teaching and learning spaces. Since, Teacher Education is greatly influenced by potential opportunities, particularly those connected to the field of Information and Communication Technology (ICT), the knowledge of the application of Digital Pedagogy to each and every teacher trainees becomes imperative. In this paper, the researchers explored the Digital Pedagogy awareness level of Teacher Trainees of Delhi B.Ed. colleges. A closed-ended questionnaire was administered to the sample of 100 Teacher Trainees. A comparison of the Digital Pedagogy Awareness level of the Teacher Trainees on the basis of gender was also done. A sample of 50 Teacher Trainees was chosen for comparing the awareness level on Digital Pedagogy and t-test was applied to the data for the analysis. It was found that 80% of the Teacher Trainees have average awareness of Digital Pedagogy and only 20% of the participants were observed to possess high awareness on Digital Pedagogy. On further analysis, it was observed that though the awareness level with respect to the 'knowledge about the Digital Pedagogy' was discovered as 'good' but when it came to the application or using the same knowledge in the classrooms, the participants were perceived to be a 'little less aware'. Hence, it is concluded in the study that a special focus must be given to the application or usability of Digital Pedagogy in the classrooms and a special attention must be given to the female B.Ed. trainees so that there should not exist any difference with respect to gender on awareness of Digital Pedagogy. It is anticipated that all novice teachers must be on the same platform when they face real classroom situations.

KEY WORDS: Digital Pedagogy, Awareness, Teacher Trainees, Technology, 21st Century Teacher and Teacher Education Programme.

Introduction

John Dewey once quoted that:-
"If we teach today's learner as we taught yesterday, we rob our children of tomorrow"

The world is rapidly transforming, bridging the gap and redesigning as per the changing needs which are entirely different, progressive and ever-changing in nature. The developing countries believe that the real investment of a nation is in its human resource. And, quality education is the backbone of any nation's success.

"Investing in education and providing 21st-century skills for students are fundamental components to the nation's continued growth and prosperity" as said by Craig Barrett, highlights the responsibility of the education system to prepare tomorrow's citizens more skillful and knowledgeable. The needs of today's learners put forth diverse questions and opportunities for educators and the entire education system to reconsider their existing styles and approach. 21st century skills as referred by Barrett are a broad set of knowledge and skills that contribute to dealing successfully with the needs of today's world. These skills include applied social efficiency, cognitive ability and skills related to lifelong learning. On the other hand, the 21st-century learner is a self-motivated, directed, globally aware, collaborator, technologically literate, socially engaged and thoughtful person. As a result the student expects more from the teaching-learning system than just acquiring the fundamentals of information.

Furthermore, the global challenge in the form of Sustainable Developmental Goals (SDG) 2030, to grow and develop universally also aims to transform the lives of people through quality education (Goal 4). On the same lines, with a vision to have India as a global knowledge superpower, the recent Education Policy of India, the National Education Policy 2020 (NEP 2020) stresses quality, equity and accessibility in Education. Now, the major question that arises is:-

How shall the needs of 21st-century learners be catered?

The answer to this question is:-
'We need to prepare the teachers in such a manner that they develop 21st century skills among the learners in the best possible manner'.

Information literacy, technology literacy and media digital communication are some of the most demanding 21st-century life skills which need to be focused from the learner's formative stage (NEP 2020). Hence, it is a time to prepare today's teacher who is well educated on 21st century skills during their pre-service Teacher Education Programme. This paper discusses the need of bringing Digital Pedagogy into teaching and learning spaces of schools and Teacher Education Institutions.

Digital Pedagogy: An Introduction

Digital Pedagogy introduces a critical pedagogical standpoint which is more thoughtful on efficient dealing of the technological tools for teaching and learning. Milton, 2013 described Digital Pedagogy as the process by which teachers acquire knowledge and takes technological support that are focused on developing students' higher-order thinking and problem-solving skills. Today, one of the goals of the teacher programme is to equip Teacher Trainees with the information and abilities necessary for the effective application and incorporation of the relevant technology. Every teacher needs to learn how to use technology, pedagogy, and the material of a given course effectively in the classroom instructions. The introduction of Technology in Education has completely changed the way the world used to view the 'TEACHER'. The conventional paradigm of the 'all knowing powerful teacher' who shares facts with the students is no longer applicable in today's classrooms.

The combination of technological abilities, pedagogical methods, and an understanding of the approach to curriculum creation that is ideal for students gave rise to the term "Digital Pedagogy". A Digital Pedagogy incorporates planning that is more problem-solving-driven than content-based and thus it portrays knowledge as something that needs to be discovered, examined, and has certain problems for which a solution must be thought out, rather than sharing it as a fact. Resultant, it encourages the development of higher-order thinking skills, and students shift from simply retaining information to fully grasping concepts (Kent & Holdway, 2009). Researches on the use of technology revealed that the application of digital pedagogy fosters critical analysis, meta-cognition, and reflection among the learners and hence it support more global connectivity (Luckin et al, 2009). Digital Pedagogy is successful in facilitating, developing, and revolutionising the

teaching and learning process. Additionally, it provides a foundation for students to take part in active learning, which allows them to creatively develop and apply knowledge in clear, meaningful ways. "Digital Pedagogy provides opportunities for meaningful, context-specific testing that improves learning in a digital context," (Smart Classrooms, 2008).

Digital Pedagogy in the Classroom: Basic Needs

Some of the abilities and competencies that a Teacher must know for implementing Digital Pedagogy in their classrooms are (Figure 1):

- Using the internet to browse and find relevant information for lesson ideas.
- Developing lesson plans involving student use of technology in the learning process.
- Analyzing and choosing the best software for a specific subject in accordance with student requirements.
- Creating printed materials including newsletters, communication, and student assignments using a range of software programmes like word processing and desktop publishing.
- Utilizing data management technologies to effectively manage to learn involves managing student data.
- Using technology, such as Excel and Access for database administration, to collect, arrange, and report data on student performance.
- Creating instruments to assess student work that uses technology, such as multimedia, word processing, databases, spreadsheets, PowerPoint, desktop publishing, and Internet/telecommunications
- Locating professional groups, internet communication with other instructors, and participation in online workshops and seminars are all examples of using the Internet to support professional development.

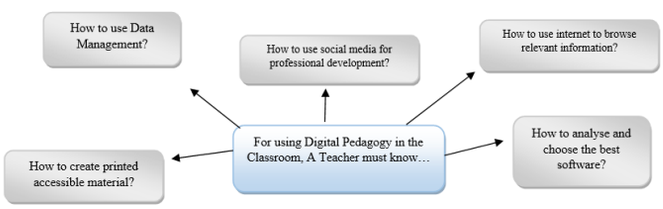


Figure 1: Competencies, a Teacher requires for execution of Digital Pedagogy in the Classroom

"Digital Pedagogy is not just a method of instruction; it is also a rapidly developing area that is home to several debates and schools of thought" (Croxall, 2013). The Digital Pedagogy gives teachers a better knowledge of how the digital generation works and learns in a connected, digitalized environment. Teachers may include technology in their lessons, which could produce a tool that could be used to change the educational process through the use of Digital Pedagogy (Faber et al., 2017).

In fact, Digital Pedagogy is more about treating these resources from a critical pedagogical standpoint than it is about employing digital technologies for teaching. Therefore, it is important to consider both 'when to use and when not to utilise digital tools', as well as to consider 'how these technologies affect learning'. Sometimes, teachers are less likely to use technology in their classrooms based on their perception of use of technology and its impact on student's productivity (Kim et al., 2013). Research also indicated that on comparing digital technology to traditional teaching methods, they serve a variety of instructional objectives and have a number of benefits (Faber et al., 2017).

Review of related Literature

Thorvaldsen, S., & Madsen, S. S., 2021 conducted a study to explore the digital divide in Teacher Education and concluded that beyond a minimum digital infrastructure and an ambitious curriculum, Digital Technology implementation and the development of digital competence in education demand much more. It was also mentioned in the study that structures on a national scale are more or less insufficient and professional development through in-service and pre-service programmes are desperately needed locally to increase instructors' motivation to teach about digital technologies and their pedagogical repertoire. In the context of underdeveloped nations, Soomro, et al., 2020 found that the digital divide frequently tends to be bigger and it was also reported in the paper that the literature on the digital divide is scarce among professors who work in higher education settings. According to their personal and positional categories, the researchers looked at the digital inequalities (at the physical, motivational, skills, and usage levels) among Pakistani professors and discovered that there were notable differences in the faculty's access to technology at the four levels. The impact of Digital Pedagogy on in-service teachers' attitudes toward digital technologies was examined by Pongsakdi, Kortlainen, and VeermansVeermans, 2021. A total of 22 in-service teachers completed the pre-test and post-test. The outcomes demonstrated that the effect of the Digital Pedagogy training depended on the teachers' comfort level with ICT. After the training, teachers with low ICT confidence demonstrated a rise in ICT confidence, but instructors with high ICT confidence did not demonstrate any appreciable changes in their confidence level. According to the study's conclusions, instructors' needs for ICT may be met by the training. Further, Vaataja and Ruokamo (2021) provided a model for Digital Pedagogy in their research on exploring a model for Digital Pedagogy and discussed pedagogical orientations, pedagogical practises, and the digital competencies it equips teachers with. According to the research, student-centeredness and socio-constructivism are two terms used to describe an instructional orientation. It was mentioned in the research that high levels of self-efficacy and effective peer cooperation abilities also help teachers integrate digital tools into their instruction more successfully. Also, a study was carried out by Sailin & Mahmor, 2018 on student teachers' Digital Pedagogy. This study focused on the role that a purposeful learning environment enables aspiring teachers to successfully incorporate digital technologies into their classrooms. The results of this study showed that there was an improvement in the confidence level of student teachers to include Digital Pedagogy in their future teaching methods. Gómez Domingo & Antoni Badia Garganté, 2016 researched on the usage of educational technology in the primary education and also on the perspectives of teachers on the usage of mobile for the teaching learning process. The researchers found that mobile technology in the classroom has two main effects: it makes knowledge more accessible and fosters greater student engagement in the learning process. The result of the study also indicated that there is a significant connection between the instructors' opinion of the effects of mobile technology on learning and the Apps they choose. Kim & Bagaka, 2005 looked at the impact of student, teacher/classroom, and school variables on the "digital gap" in primary school pupils' access to and use of various technology tools. The findings showed that school location, technical assistance at the school, and instructors' attitudes toward technology were all important predictors of the classroom student usage-gap between those who had access to computers at home and those who do not. It was also discovered that there was a strong correlation between teachers' levels of experience and pupils' use of computer tools.

The analysis of review of the literature revealed that the usage of Digital Pedagogy in education opens up ample opportunities to grow and develop positively for both teachers and students. However, it is concluded after the review that the applicability knowledge and perception of Indian Teacher Trainees are less explored in India. Hence, the researchers attempted to carry out a survey study where the main objective was to study the awareness of the Teacher Trainees on Digital Pedagogy and its applicability in the real classrooms.

The objective of the current study was to examine how digital pedagogy is used in Indian classrooms. In order to do so, the researchers felt the need of assessing the 'knowledge' and 'means of execution of digital pedagogy in the classroom' of B.Ed. Teacher Trainees. Hence, the researchers selected the Teacher Trainees as a sample to know the reality related to understanding and application of Digital Pedagogy in the teaching-learning space.

Objectives of the study:

- To assess the Digital Pedagogy Awareness level of the Teacher Trainees of B.Ed. Colleges of Delhi.
- To compare the Digital Pedagogy Awareness level of the Teacher Trainees on the basis of gender.

Methodology of the Study

This is a descriptive study with a quantitative paradigm. The researchers have administered a survey tool to gauge the awareness level of the Teacher Trainees on the usage of Digital Pedagogy in the classrooms. A probability sampling technique was used to select the sample. Through random sampling, ten B.Ed. Colleges of Delhi were selected. The researchers contacted 132 Teacher Trainees enrolled with the Teacher Education Colleges of Delhi. After explaining the objective of the study and gaining their consent to be the part of the study, the researchers administered the tool. After carrying out careful study of the filled tool, the completely filled-in tools were made part of the analysis. And hence, 100 participants were included in the study. Quantitative analysis was carried out on the basis of which high awareness; average awareness and low awareness of the usage of Digital Pedagogy were stated. Also, a comparative picture based on gender reflected in the findings which highlighted the difference in the Digital Pedagogy awareness level of male and female Teacher Trainees.

Population and Sample of the Study:

The B.Ed. students are the true population of this research study and hence the sample was selected from the B.Ed. students' population. Probability sampling technique was used to select the B.Ed. colleges of Delhi. The researchers executed a random sampling technique for the selection of two B.Ed. colleges of Delhi from where a sample of 100 Teacher Trainees was prepared for the study. Based on the available resources and time, 10 colleges were randomly selected by the researchers. The Principals of the colleges were contacted and approval was taken to conduct the survey in the colleges. The questionnaire was administered on the teacher trainees randomly and only the filled in questionnaire were made the part of the study at the end.

Out of 100 Teacher Trainees, two lists were prepared based on gender information. One list of Male teacher trainees and other list of female teacher trainees were prepared for the further comparative analysis. Hence, a sample of 50 Teacher Trainees (25 male and 25 female) was prepared for objective 2.

Description of the Tool:

A closed-ended questionnaire was prepared to know the Digital Pedagogy

awareness level of the Teacher Trainees. The first draft of the tool had 25 statements and was sent to two research experts for their feedback and validation. Based on the feedback and suggestions, modifications in the tool were made. A 10 statements questionnaire was prepared with 3 scale options i.e. Yes/ Most of the Times, A Little/ sometimes and No/ Never. The statements are framed on two dimensions i.e. Usage and Knowledge about Digital Pedagogy. 5 statements were constructed on Usage dimension (item nos. 1, 2, 4, 5, 6) and 5 statements were constructed on Knowledge dimension (item nos. 3, 7, 8, 9, 10). The final draft was again shared with one research expert for approval. After the construction of the tool, its reliability was assessed. The internal consistency reliability check was done by the test-retest method and was found to be 0.78.

The scoring of the tool is as follows:-

Preference options	Yes/ Most of the Times	A Little/ Sometimes	No/ Never
SCORING	3	2	1
Maximum Score	30		
Minimum Score	10		
Score Range	10-30		
High Awareness Level Average Awareness Level Low Awareness Level	21-30 11-20 0-10		

Analysis and Interpretation

Objective 1: To assess the Digital Pedagogy Awareness level of the Teacher Trainees of B.Ed. Colleges of Delhi.

For this objective, the researchers administered a 10-statement questionnaire on the Teacher Trainees. Since the tool was prepared on two dimensions, dimension-wise analysis is as follows:-

a) Descriptive Analysis

Digital Pedagogy Awareness Tool	High Awareness Level	Average Awareness Level	Low Awareness Level
N=100	20%	80%	0%

Interpretation:

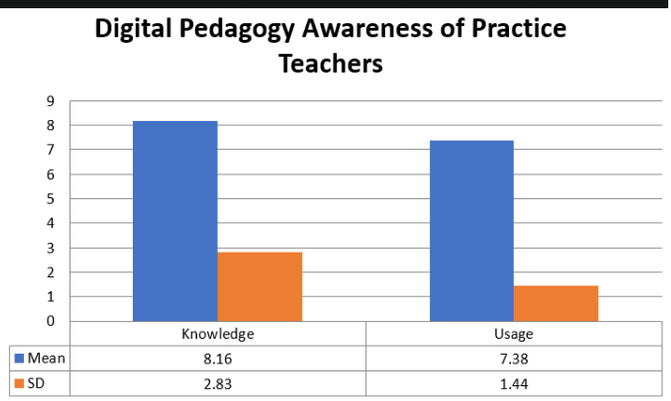
The above data shows that most of the Teacher Trainees who were engaged in this research have average awareness of Digital Pedagogy and there are only a few of the participants who have a high awareness of Digital Pedagogy. Hence, it is interpreted that the awareness level of the Digital Pedagogy must be worked upon by the teacher training institutes through seminars, workshops, conferences etc. during the pre-service teacher training programme so that all the B.Ed. trainees possess high awareness of Digital Pedagogy as it is the need of 21st-century learners.

b) Dimension-wise Descriptive Analysis

Table 1: Dimension-wise descriptive analysis of Digital Pedagogy Awareness Tool

Dimensions of Digital Pedagogy Awareness Tool	Mean	Standard Deviation (SD)	Variance S2
Knowledge	8.16	2.83	8.05
Usage	7.38	1.44	2.07

Figure 2: Graphical presentation of Dimension wise analysis of Digital Pedagogy Awareness Tool



Interpretation

The above table (Table 1) and graph (Figure 2) revealed that the mean score (8.16) in the knowledge dimension is higher than the usage dimension (7.38). This indicates that the Teacher Trainees have better awareness with respect to the knowledge about the Digital Pedagogy whereas when it comes to application or using the same knowledge, the participants seem to be a little less. Hence, it can be interpreted that although the Teacher Trainees possess the knowledge about the latest technology-based pedagogy, the usage and application of the same is less. Hence, the B.Ed. trainees must be motivated to apply the knowledge regarding Digital Pedagogy.

Objective 2: To compare the Digital Pedagogy Awareness level of the Teacher Trainees on the basis of gender.

H01: *There is no significant difference in the Digital Pedagogy awareness level of the Teacher Trainees on the basis of gender.*

Dimension wise t test calculation

Table 2: Dimension-wise inferential analysis of Digital Pedagogy Awareness Tool

Digital Pedagogy Awareness	N	Mean	t stat value	Level of Significance
Male Teacher Trainees	25	18.36	11.85	0.05
Female Teacher Trainees	25	8.4		

The *t-value* is 11.85155. The *p-value* is < .00001. The result is significant at $p < 0.05$.

T-value Calculation

$s^2_p = ((df_1/(df_1 + df_2)) * s^2_1) + ((df_2/(df_2 + df_2)) * s^2_2) = ((24/48) * 9.57) + ((24/48) * 8.08) = 8.83$

$s^2_{M1} = s^2_p/N_1 = 8.83/25 = 0.35$

$s^2_{M2} = s^2_p/N_2 = 8.83/25 = 0.35$

$t = (M_1 - M_2)/\sqrt{(s^2_{M1} + s^2_{M2})} = 9.96/\sqrt{0.71} = 11.85$

Interpretation

From the above table, it is revealed that the mean of male Teacher Trainees is higher i.e. 18.36 and the mean of female Teacher Trainees is 8.4. Hence, it is interpreted that the Digital Pedagogy awareness level is found to be lower among female Teacher Trainees as compared to their male counterparts (Gomez-Trigueros, I.M.; Yanez de Aldecoa, C., 2021). The similar kind of finding was also reported in the research carried out by Gomez-Trigueros, I.M.; Yanez de Aldecoa, C. in 2021.

The above table also revealed that on computing the t-test on the Digital Pedagogy awareness level of Teacher Trainees, to test hypothesis *H01*, it was found that the computed value of the male Teacher Trainees was found to be 11.85 on 0.05 level of significance. Since the test statistics is smaller than the critical value it is found to be in the rejection region. Therefore, the null hypothesis is **rejected** and it is concluded that:-

"There is a significant difference in the Digital Pedagogy awareness level of male and female Teacher Trainees."

Implications

- Teachers-in-training must be able to use technology in their lesson planning while they are in their teaching practice. Hence, individual efforts must be there to explore various technological integration techniques. The Teacher Trainees must be passionate to upgrade their knowledge with the latest technological tools and programmes which may support them in handling the diverse needs of the learners in the best possible manner.
- They must comprehend their position in technologically advanced classrooms and acquire knowledge and abilities in information processing, management, and exploration of Internet technologies for use in teaching and learning, among other things.
- The curriculum of the teacher education programme must also be designed in such a way that it gives ample exposure to the teacher trainees on the application and usage of Digital Pedagogy.
- The teacher educators must possess sound knowledge and understanding of the integration of content, pedagogy and technology for learning and assessment and exhibit the same in their teaching so that the B.Ed. trainees may learn it through observation and practice.

Conclusion

As it is universally accepted that teachers play a crucial role in determining the development of society and the nation, it becomes imperative to focus on the appropriate personal, professional, emotional and social growth of a teacher. However, the research studies highlight that teacher education has come under fire over the years for its generally outdated and traditional pedagogical approaches. Therefore, the main goal of the education system is to create teachers who are aware of the current system's needs and requirements, a teacher who is skilled with 21st-century skills (Ertmer & Otenbreit-Leftwich, 2010). The 21st-century demands techno-pedagogues, people who can create and use Digital Pedagogy in education (Kent & Holdway, 2009).

This study found that the majority of the Teacher Trainees who participated in the study as a sample were familiar with Digital Pedagogy as well as its application in the classroom. However, it was also noted that female Teacher Trainees were slightly less knowledgeable than their male counterparts. This finding is in consensus with the findings of the study conducted by Gómez et al, 2021. Gomez et al. demonstrated that with regard to the teaching task, female participants had significantly poorer self-perceptions of their digital teaching competence than male participants do, as well as a lower propensity to use technologies. Hence, through this study emphasis on the application of Digital Pedagogy is highlighted (Ertmer & Otenbreit-Leftwich, 2010) with a special focus on the female teacher trainees so that there should not exist any difference with respect to gender on awareness of Digital Pedagogy. It is anticipated that all novice teachers must be on the same platform when they face real classroom situations.

REFERENCES

1. Collis, B. and Jung, I. S. (2003). Uses of information and communication technologies in teacher education. In B. Robinson & C. Latchem (Eds.). Teacher education through open and distance learning. London: Routledge Falmer, 171-192.
2. Cornu, B. (1995). New technologies: integration into education, in D. Watson and D. Tinsley, (Eds), Integrating Information Technology into Education. Chapman and Hall, London.
3. Croxall, B. and Koh, A. (2013) Digital Pedagogy? A Digital Pedagogy UN conference, retrieved from http://www.briancroxall.net/digitalpedagogy/what-is-digital-pedagogy/ on 21/08/2015
4. Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. Journal of Research on Technology in Education, 42(3), 255-284.
5. Faber, J., (2017). The effects of a digital formative assessment tool on mathematics achievement and student motivation: Results of a randomized experiment. Computers & Education, 106, 83–96.
6. Gómez-Trigueros, I.M.; Yáñez de Aldecoa, C. (2021). The Digital Gender Gap in Teacher Education: The TPACK Framework for the 21st Century. Eur. J. Investigation in Health, Psychology and Education, (11), 1333–1349.
7. Gómez Domingo & Antoni Badia Garganté. (2016). Exploring the use of educational technology in primary education: Teachers' perception of mobile technology learning impacts and applications' use in the classroom. Computers in Human Behavior, 56, 21-28. https://doi.org/10.1016/j.chb.2015.11.023
8. Hawkridge, D. (1990). Who needs computers in schools, and why? Computers and Education, 15:1–3.
9. Khirwadkar, A. (2007) Integration of ICT in education: pedagogical issues. Retrieved from http://www.journal.au.edu/edu_journal/jan2007/article06_vol1no.1.pdf on 10/03/2012
10. Kim, C., Kim, M. K., Lee, C., Spector, (2013). Teacher beliefs and technology integration. Teaching and Teacher Education, 29, 76–85. https://doi.org/10.1016/j.tate.2012.08.005.
11. Kim, S. H., & Bagaka, J. (2005). The digital divide in students' usage of technology tools: a multilevel analysis of the role of teacher practices and classroom characteristics. Contemporary Issues in Technology and Teacher Education, 5(3/4).
12. Koehler, M. J. and Mishra, P. (2005). What Happens When Teachers Design Educational Technology? The Development of Technological Pedagogical Content Knowledge. J. Educational Computing Research, 32(2), 131-152.
13. Kurvinen, E.,et al. (2016). Automatic assessment and immediate feedback in third grade mathematics (pp. 89–94). Dublin: Proceedings of Ireland international conference on education.
14. McLaughlin and Oliver. (1999). Pedagogic roles and dynamics in telematics environments. In: Telematics in Education: Trends and Issues, M. Selinger, and J. Pearson, (Eds). Oxford: Elsevier Science, 32–50.
15. MHRD. (1968). National Policy on Education (1968). New Delhi, India: GoI.
16. MHRD. (1986). National Policy on Education (1986). New Delhi, India: GoI.
17. MHRD. (2020). National Education Policy (2020). New Delhi, India: GoI.
18. Milton, M. (2013). Digital literacy and digital pedagogies for teaching literacy: Pre-service teachers' experience on teaching rounds. Journal of Literacy and Technology. 14(1), 72–97.
19. Pongsakdi, N., Kortelainen, A. & Veermans, M. (2021). The impact of Digital Pedagogy training on in-service teachers' attitudes towards digital technologies. Educational Informational Technology , 26, 5041–5054. https://doi.org/10.1007/s10639-021-10439-w
20. Soomro, K.A., et al. (2020). Digital divide among higher education faculty. International Journal Education Technology High Education, 17, 21. https://doi.org/10.1186/s41239-020-00191-5
21. Smart classrooms BYTES, (2008). E-learning for smart classrooms, retrieved from http://education. qld.gov.au/smartclassrooms/pdf/scbyte-elearning.pdf/ on 26/02/2016
22. Thorvaldsen, S., & Madsen, S. S. (2021). Decoding the Digital Gap in Teacher Education: Three Perspectives across the Globe. In (Ed.), Teacher Education in the 21st Century - Emerging Skills for a Changing World. Intech Open. https://doi.org/10.5772/intechopen.96206
23. United Nations. (2015). Sustainable Development Goals. Retrieved March 12, 2019 from: https://sustainabledevelopment.un.org